

NON-PUBLIC?: N  
ACCESSION #: 9205260156  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: DIABLO CANYON UNIT 1 PAGE: 1 OF 6

DOCKET NUMBER: 05000275

TITLE: LOW VACUUM TURBINE TRIP AND SUBSEQUENT REACTOR TRIP  
DUE TO A  
PROGRAMMATIC DEFICIENCY  
EVENT DATE: 04/25/92 LER #: 92-004-00 REPORT DATE: 05/20/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 50

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: RAYMOND L. THIERRY, SENIOR TELEPHONE: (805) 545-4004  
REGULATORY COMPLIANCE ENGINEER

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: SH COMPONENT: V MANUFACTURER: M360  
REPORTABLE NPRDS: NO

SUPPLEMENTAL REPORT EXPECTED: NO

#### ABSTRACT:

On April 25, 1992, at 0408 PDT, with Unit 1 in Mode 1 (Power Operation) at 50 percent power, Unit 1 experienced a low vacuum turbine trip and subsequent reactor trip. The unit was stabilized in Mode 3 (Hot Standby) in accordance with plant emergency procedures.

The turbine trip occurred during the removal of the Main Feedwater Pump (MFP) 1-1 turbine from service to allow troubleshooting and repair of the turbine trip oil system. Problems that occurred during MFP turbine isolation caused degrading condenser vacuum. The root cause for this event is programmatic deficiency. Inadequate instructions were available for the task. In addition, the condenser vacuum pump suction line check valve leaked excessively.

The operating procedure for removing an MFP from service was revised to add precautions about removing the pump from service when the condenser may have degraded air removal capacity. In addition, the condenser vacuum pump suction line check valve for each unit shall be inspected and repaired as necessary before the end of the next refueling outage for each unit.

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END OF ABSTRACT

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## I. Plant Conditions

Unit 1 was in Mode 1 (Power Operation) at 50 percent power.

## II. Description of Event

### A. Description of Event:

A planned unit curtailment was in progress to clean the main circulating water conduits (NN)(CND) associated with Circulating Water Pump (CWP) 1-1 (NN)(P) and the west half of the condenser (SG)(COND). The east half of the condenser was in service. Plant licensed and non-licensed operators were removing Main Feedwater Pump (MFP) 1-1 (SJ)(P) from service to allow troubleshooting of the trip oil (SJ) system.

At 2342 PDT, MFP 1-1 was secured for maintenance. At 0342 PDT, while isolating the MFP 1-1 turbine from the condenser in accordance with operating procedures, condenser vacuum began to degrade. The partial loss of vacuum (increase in condenser back pressure) was observed after the exhaust vent valve (SJ)(V), Main Steam (MS) 1-738, was cracked open to vent the turbine casing (SJ)(TRB). Closing MS-1-738 stabilized the back pressure at approximately 2.5 inches of mercury.

At 0345 PDT, an attempt to reseal MS-1-738 resulted in a further increase in condenser back pressure (to approximately 4.5 inches of mercury).

At 0352 PDT, a second secondary air ejector (SH)(EJR) was placed in service, but had no immediate effect on condenser back pressure.

At 0359 PDT, the Unit 1 Shift Foreman was alerted to the condenser problems. He directed the operators to back out of the job and re-establish sealing steam to the MFP 1-1 turbine.

Sealing steam was re-established, and the MFP 1-1 turbine casing was vented to the main condenser. Since the turbine casing was full of air, this injected another volume of air into the condenser, causing condenser back pressure to increase to approximately 6 inches of mercury. The condenser back pressure turbine trip setpoint is a back pressure of approximately 8 inches of mercury.

At 0400 PDT, the control room operators entered Abnormal Operating Procedure AP-7, "Loss of Condenser Vacuum." In accordance with this procedure, a turbine load decrease was initiated. This load decrease had no significant effect on indicated condenser vacuum.

At 0405 PDT, in accordance with AP-7, non-licensed operators in the turbine building (NM) were directed by telephone to place the condenser vacuum pump (SH)(P) in service. A second operator was dispatched to help. The vacuum pump was started from the control room. The operators

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did not have time to review the place in service procedure for the vacuum pump because of the sense of urgency placed on this task. The second operator stated that the instruments did not look right. The first operator stated that the seal water pump (SH)(P) had been verified to be running, that the seal water sump level had been checked, and that the control room had noted that getting the vacuum pump on-line was urgent to save the plant. Investigation revealed that the vacuum pump seal water isolation valve (SH)(V) had not been opened since the last time the vacuum pump was operated.

At 0407 PDT, the vacuum pump suction valve (SH)(V) from the Unit 1 west condenser half was opened. Condenser back pressure increased rapidly. The pump suction valve was closed as soon as it was noted that this operation worsened condenser conditions. However, the rapid increase in condenser back pressure exceeded the turbine trip setpoint, and at 0408 PDT Unit 1 experienced a low vacuum turbine trip and subsequent

reactor trip. The unit was stabilized in Mode 3 (Hot Standby) in accordance with plant emergency procedures.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

Condenser Vacuum Pump Suction Line Check Valve CND-1-747 (SH)(V) was observed to leak excessively when the condenser vacuum pump suction valve was opened.

C. Dates and Approximate Times for Major Occurrences:

1. April 25, 1992, at 0342 PDT: MFP turbine 1-1 was isolated from condenser, vacuum transient starts.

2. April 25, 1992, at 0408 PDT: Event date / Discovery date  
- Alarms and other indications in the control room announced the reactor trip.

3. April 25, 1992, at 0510 PDT: Four-hour, non-emergency report made to NRC in accordance with 10 CFR 50.72.

D. Other Systems or Secondary Functions Affected:

None.

E. Method of Discovery:

Alarms and other indications in the control room provided immediate notification to the control room operators that the event had occurred.

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F. Operator Actions:

Plant operators stabilized the plant in Mode 3 (Hot Standby) in accordance with Emergency Operating Procedures E-0, "Reactor Trip or Safety Injection," and E-0.1, "Reactor Trip Recovery."

#### G. Safety System Responses:

1. The main turbine tripped.
2. The reactor trip breakers opened and all control and shutdown rods fell into the core.
3. The auxiliary feedwater pumps started.

#### III. Cause of the Event

##### A. Immediate Cause:

The turbine tripped on low condenser vacuum (high condenser back pressure). The reactor tripped due to the turbine trip with reactor power greater than P-9.

##### B. Root Cause:

###### 1. Programmatic Deficiency

The root cause of this event is programmatic deficiency, in that inadequate instructions were available for the task. Since the operators were instructed to place the vacuum pump in service without an opportunity to review or obtain operating procedures, the seal water isolation valve was not opened as required.

###### 2. Component Failure

The condenser vacuum pump suction check valve, CND-1-747, appears to be suffering severe leakage since, if it worked properly the vacuum should not have been lost through the unsealed vacuum pump.

##### C. Contributory Cause:

A contributory cause to this event is that the instructions for removing an MFP from service at power did not provide for precautions for clearing the pump in a condition where the main condenser could not handle increased air in-leakage.

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#### IV. Analysis of the Event

A reactor trip due to a turbine trip is a previously analyzed Condition II event described in the Final Safety Analysis Report (FSAR) Update Section 15.2.7, "Loss of External Electrical Load and/or Turbine Trip." The FSAR Update shows that following a turbine trip/reactor trip, the automatic steam dump system (SB) accommodates the excess steam generation. Reactor coolant (AB) temperatures and pressure do not significantly increase if the steam dump system and pressurizer pressure control system (AB) (PZR) are functioning properly. Since the 10 percent steam dump and pressurizer control system functioned as designed, the health and safety of the public were not adversely affected, and there were no adverse consequences or safety implications resulting from this event.

#### V. Corrective Actions

##### A. Immediate Corrective Actions:

Plant operators stabilized the plant in accordance with Emergency Operating Procedures E-0 and E-0.1.

##### B. Corrective Actions to Prevent Recurrence:

1. The condenser vacuum pump suction line check valve will be inspected and repaired in each unit before the end of the next refueling outage, currently scheduled for September 1992 for Unit 1 and March 1993 for Unit 2.

2. An Operations Incident Summary was prepared and distributed describing this event. This summary was prepared to sensitize operations personnel to this type of personnel error.

3. A review will be conducted of all Emergency and Abnormal Operating procedures to identify situations where operators might be dispatched to perform equipment operations without normal procedure issuance (prompt actions necessary).

Local instructions/procedure postings will be added as determined by this review.

4. Operating Procedure C-8:III, "Shutdown and Clearing of a Main Feedwater Pump," was revised to add precautions and

limitations for possible vacuum transients when removing the pump from service. In addition steps were added to configure the plant to handle increased air in-leakage.

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## VI. Additional Information

### A. Failed Components:

CND-1-747, the check valve in the condenser vacuum pump suction line from Unit 1 condenser appears to be leaking excessively.

Manufacturer: Mission Drilling Products

Model Number: 155MF-83

Type: C0244

### B. Previous LERs on Similar Problems:

None.

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Pacific Gas and Electric Company 77 Beale Street  
San Francisco, CA 94106  
415/973-4684

Gregory M. Rueger  
Senior Vice President and  
General Manager  
Nuclear Power Generation

May 20, 1992

PG&E Letter No. DCL-92-124

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80  
Diablo Canyon Unit 1

Licensee Event Report 1-92-004-00  
Low Vacuum Turbine Trip and Subsequent Reactor Trip Due to a  
Programmatic Deficiency

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv), PG&E is submitting the enclosed Licensee Event Report concerning a low vacuum turbine trip and subsequent reactor trip.

This event has in no way affected the health and safety of the public.

Sincerely,

Gregory M. Rueger

cc: Ann P. Hodgdon  
John B. Martin  
Philip J. Morrill  
Harry Rood  
CPUC  
Diablo Distribution  
INPO

DC1-92-OP-N019

Enclosure

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